

Installation and Operating instructions

Air Humidification System BS

Type BS5/10



DRAABE

A WMH company

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1. Introduction

1.1 Right at the beginning

Thank you for deciding on the **DRAABE air humidification system BS**.

The air humidification system BS was constructed according to the present-day state of the art and the approved safety requirements. Nevertheless dangers may arise for the user and / or third persons and / or tangible assets may be damaged in case of improper usage of air humidification systems.

In order to ensure a safe, proper and economical operation, please pay attention to and follow all specifications and notes on safety contained in this technical documentation.

If you have any queries about matters which are not dealt with in this document, or if you need more details, please contact your local NORTEC regional distributor, or call our Service Hotline (+1 613 822 0335). They will be glad to help.

1.2 Notes on technical documentation

Definitions

This technical documentation deals with the **DRAABE air humidification system BS** in its construction versions **BS5, BS10**.

The explanations contained in this technical documentation are limited to:

- the **planning** of an air humidification system BS.
- the **installation**, the **operation** and the **maintenance** of the air humidification system BS

The technical documentation is supplemented by various separate documentation sheets (leaflets, order forms, etc.). Relevant cross-references to these publications can be found within this technical documentation whenever necessary.

Agreement



This symbol marks **notes concerning safety and dangers**. In case of non-compliance, physical injuries and / or material damage may be the result. Notes concerning safety and dangers are also marked with **CAUTION**.



This symbol marks important notes. These are also referred to by **NOTES**.



[You find this symbol on the type plates of all devices (atomisers, etc.). It requests you to read through the technical documentation **before** performing any action on the system. In the case of ambiguity after reading through the technical documentation, you are requested to contact the technical customer service of the manufacturer at first **before** any action is carried out.

Storage

Please keep the technical documentation in a safe place where it is always in your reach. If you have lost the documentation, please contact NORTEC.

Language versions

This technical documentation is available in various languages. Please contact NORTEC in this connection.

2. For your safety

Agreement on use



The air humidification system BS is exclusively designed for the **controlled humidifying of rooms** within the framework of the specified operating conditions in rooms that are not explosion-endangered. Any other utilisation is regarded as not contractual and may result in risks caused by the system.

Contractual use also implies **observing of all pieces of information contained in this instruction manual** (especially the notes on safety) and strictly paying attention to the operation conditions.

General notes on safety

Only persons who made themselves familiar with the product and who are sufficiently qualified for the relevant works may install and operate it. Amending the different technical documentation sheets by means of company-internal directions concerning the responsibility and the obligatory registration, work organisation, qualification of the personnel, etc. lies within the customer's responsibility.

In accordance with chapter 6, the system has to be switched off before starting works on components of the air humidification system BS and is to be secured against unintended putting into operation (switch off the control device, shut off the water supply and make the systems pressure-less).



Pay attention to all local **safety regulations**:

- Concerning dealing with **electric and electronic devices** that are supplied from the mains.
- Concerning the **installation of water systems**.

Badly maintained air humidification systems may be harmful to health. Therefore it is obligatory to comply with the intervals of maintenance.

If it is to be assumed that the air humidification system BS cannot be operated without danger any more, it has to be switched off immediately and to be secured against unintended activation. This can be the case under the following circumstances:

- if components of the system are damaged
- if the system does not work correctly any more
- if connections or pipes are leaking.

The air humidification system BS is to be operated only within the framework of the specified operating conditions.



- **CAUTION!** When the air humidification system BS is installed in a room without water drainage, water level sensors that safely close the water supply in case of a possible leakage in the water-supply system are to be installed in the room.

- In order to avoid water damage, do not store any **materials that can be damaged by water directly under the atomiser nozzle.**



- **CAUTION! Danger of corrosion!** To avoid dangers, do not store any corrodible components within the area of the aerosol flow (no rebounding surface for the aerosols).



- **CAUTION!** Depending on the content of minerals in the pipe water or the treated water respectively, scale deposits that are more or less pronounced can form. Sensitive materials and devices have to be protected appropriately or to be moved out of this area.

- Apart from the works described in this direction s, no further interventions have to be carried out on the air humidification system BS.

- Use **only the original accessories and spare parts** of NORTEC.

- Without the written consent of NORTEC, no changes may be carried out on the air humidification system BS.

- In case of changes on the system, an approval carried out by the NORTEC customer service or by persons authorised by NORTEC has to be carried out previous to the first switching on.

3. Product survey

3.1 System versions BS

The **DRAABE air humidification system BS** is available in 2 different versions:

- BS5
- BS10

Besides, both systems BS5 and BS10 are absolutely identical, with one single difference. Therefore they are jointly dealt with in this documentation. The BS5 is fitted with only one nozzle, whereas the BS10 is fitted with two nozzles. So the only difference is their atomising capacity.

3.1.1 System BS5/10

System description

The system BS mainly consists of atomisers which atomise the water supplied to them into the air. All system components are integrated into one plastic housing. The atomising nozzles are assembled firmly onto the upper part of the housing. In addition, every device is fitted with a hygrostat which measures the relative humidity (indicated in per cent, r.h. in %) in the ambient air. It compares the measured value with the pre-selected set point and thus controls the device.

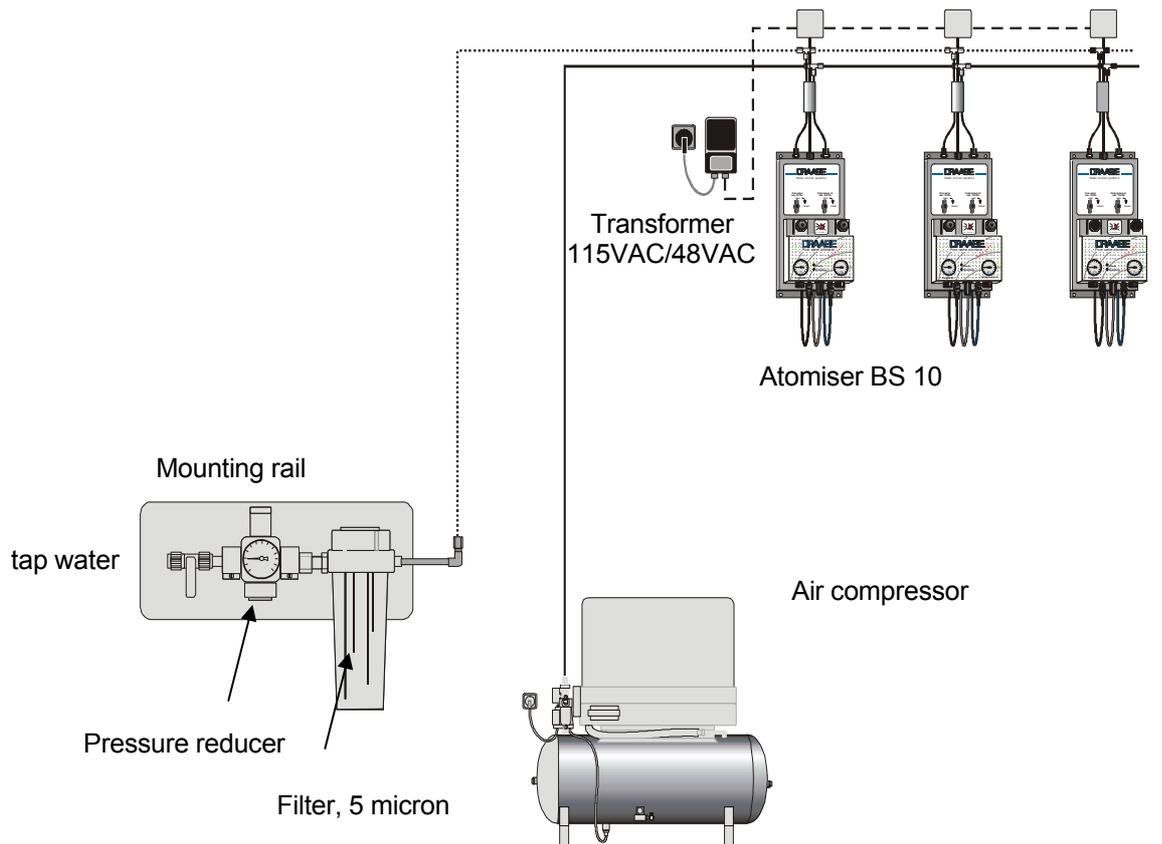
Individual smaller rooms or large halls can be humidified, depending on the quantity of water that is available and the length of the hoses. The atomisers are designed for **wall mounting** and are delivered in a version that is **ready for connection**.

Designation	Number of nozzles	Max. humidifying capacity at an atomising pressure of 5 bar (72 psi) ¹⁾
BS5	1	5 l/h*
BS10	2	10 l/h*

* **Important!** This data depends on the setting selected for the device.

Both devices are two-component atomisers. That means that they need both water and compressed air for atomising.

View of the system BS (the illustration shows the BS10)



The atomisers are fitted with a UV-C bioreactor.

3.2 Functional description

3.2.1 Functional description systems BS5/10

The device is available in two versions. The BS 5 and the BS 10 are controlled by a hygrostat that is placed in the atomiser head.

The device consists of two components: the wall bracket (1) and the atomiser (2).

The wall bracket consists of the shut-off valves for water (3) and air (4) as well as the supply lines for water (5), air (6) and operating voltage (7).

The atomiser consists of the set point adjuster (8), the nozzle (9) as well as the LED indicator lights standby (green) and atomisation (red) (10).

The desired air humidity is pre-selected on the set point adjuster. When the value falls short of the chosen value, the device switches itself on (LED atomisation emits light). When the set point is reached again, the device switches itself off.

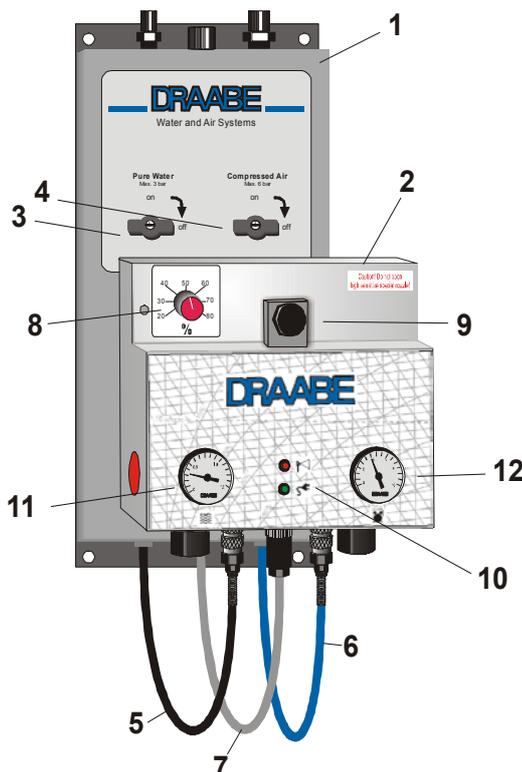
If the systems BS 5/10 switches itself off, the compressed air supply remains switched on, also after the water was switched off, for about 1 minute (air-blowing).

The standby indicator lights up as soon as the operating voltage (48Vac) is available on the device.

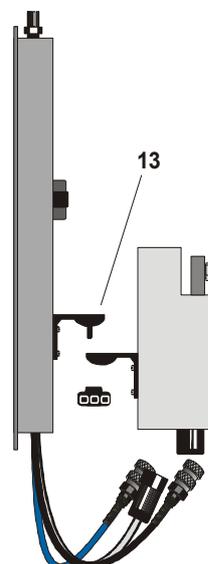


NOTE:

Maximum inlet pressure water is 3bar (43psi)
Maximum inlet pressure air is 6bar (87psi)



Check the pressure values of the manometers
Water 0,2 – 0,4 bar (2.9-5.8psi) (11)
Air 3 – 4 bar (43-58psi)(12)



The atomisers can be adjusted by means of the ball-and-socket (13) joint.

4. Basic principles for planning

The basic principles for planning described below are theoretical ones. In practice, the necessary humidification capacity is influenced by parameters that can not be covered by this documentation. For this reason, the values that were determined in theory have to be complemented by practical values or corrected in many cases. Our advisors will be pleased to assist you.

4.1 Notes on the planning of air humidification systems in one area

Proceed as follows when selecting and/or dimensioning the air humidification system BS:

- Determining the volume of the room and the air changes
- Determining the set points (temperature and humidity/relative humidity)
- Determining the humidification areas
- Calculating the maximum humidification capacity
- Defining the device requirements

The chapter below contains all necessary pieces of information on the individual planning steps. For every planning step, a **calculation example** based on assumed system data has been included. The three different examples are supposed to illustrate the procedure. Naturally it is not possible to cover all applications by means of examples. The air humidification system BS offers a variety of solutions for individual air humidification in a large variety of rooms .

If you have any further queries or problems, the NORTEC sales team will be glad to help.

Phone:+ 1 613 822 0335

4.1.1 Example 1 (BS10)

In this case, only one room is to be humidified. As every atomiser is fitted with its own hygrostat, different zones within one area (room) can be humidified individually.

EXAMPLE 1

A DRAABE air humidification system BS for direct room air humidification is to be installed in the paper store of a large printing works. The following data is available:

<i>Room measurements (l x w x h) in ft:</i>	<i>98.0 x 66.0 x 11.5</i>
<i>Number of air changes per hour:</i>	<i>2.2</i>
<i>Outside air conditions in winter:</i>	<i>5°F/90 % r.h.</i>
<i>Desired room temperature:</i>	<i>70°F</i>
<i>Desired relative air humidity:</i>	<i>53 % r.h.</i>
<i>Areas:</i>	<i>One</i>

4.1.1.1 Calculating the maximum humidification capacity

The maximum humidification output is calculated by the following formulas:

with m and kg

$$\text{mH}_2\text{O} = \frac{V \times 1.2 \times \text{LW/h} \times (x_2 - x_1)}{1,000}$$

with ft and lb

$$\text{mH}_2\text{O} = \frac{V \times 1.0 \times \text{LW/h} \times (X_2 - X_1)}{A \times V_1}$$

mH₂O: Maximum humidification output in **kg/h (lb/h)**

V: Volume of air to be humidified in **m³ (ft³)**
(formula: L x W x H)

V₁: Decrease/increase in volume of air in **ft³/lb**

AE/h: Number of air exchange cycles per hour

The number of air exchange cycles per hour depends on the usage of the room and must be determined by the system planner as part of the planning process. The following guide values can be taken as the basis:

- Textiles processing: 3 - 7 AE/h
- Printing works: 2 - 5 AE/h
- Warehouses: 1 - 3 AE/h
- Chilled storage: max. 1 AE/h

1.2(1.0): Fixed value for the specific weight of air in **kg/m³**

A: Fixed value (7,000) for the conversion of pounds in grains in **grains/lb**.

x₂: Desired absolute humidity of the room air in **g/kg (grains/lb)**

x₁: Minimum absolute humidity before humidification in **g/kg (grains/lb)**



NOTES:

Where outside air represents 100 % of the air, the outside air condition in winter must be applied. If there is an air circulation system (30 % outside air, 70 % recirculated air), the resultant air mix must be applied.

For the values for **x₁**, **x₂**, **x₃** and **V₁** refer to the **psychrometric chart** in the appendix.



NOTES:

The formula takes no account of absorption or discharge of humidity by materials in the humidified room.



CAUTION: This heating-up is ensured by the waste heat of machines in most cases.

SOLUTION EXAMPLE 1

In this example, a humidification capacity of 46 kg/h (101 lbs/h) is required.

In case of questions regarding the calculation of the humidification capacity, please contact NORTEC.

4.1.1.2 Determining the device requirements

Now the decisive value of the necessary humidification capacity is available for the determination. The following notes on the capacity of the atomisers provide a second basis.

Capacity BS10 10 Kg/h (22 lbs/h)

EXAMPLE 1

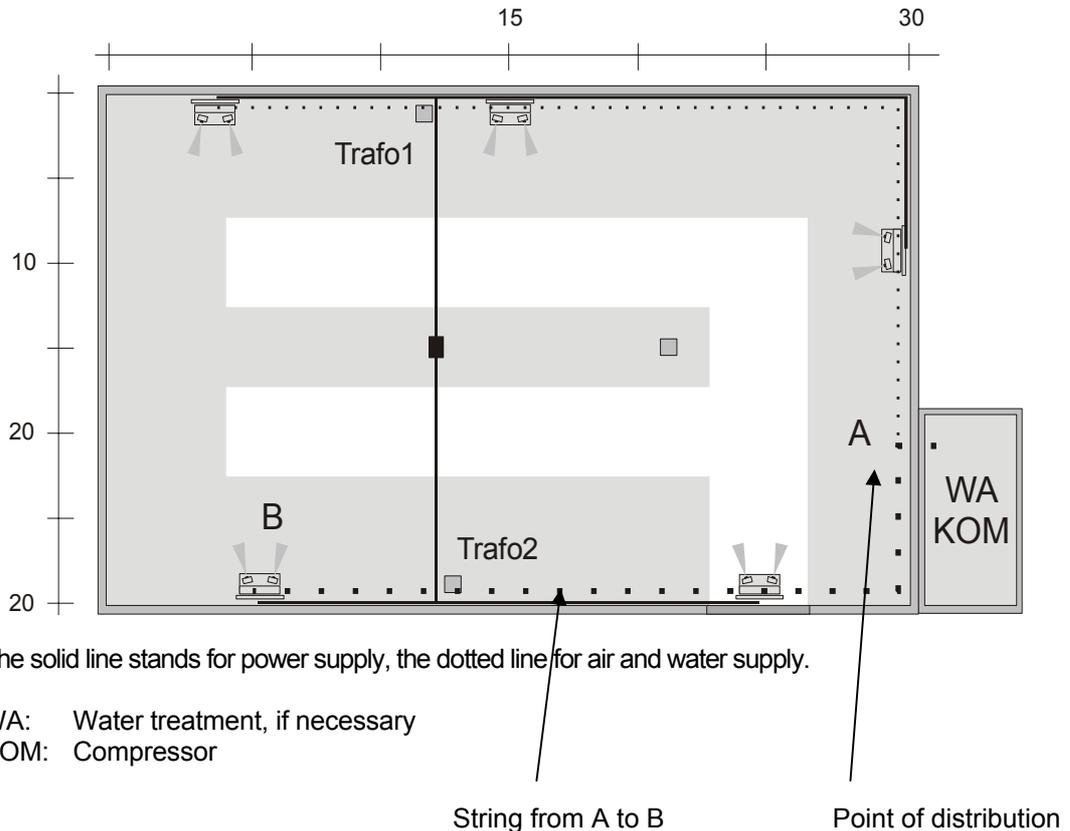
Total water volume (mH₂O) = 46 kg/h (101 lbs/h)

Required:

5 units BS10

2 units transformer (trafo)

The tube requirements for air supply and power supply depend on the cable. They are determined on the basis of the ground plan. The result for this example is **approx. 70 meters (230 ft)** of the NORTEC quick assembly kit (**SMB**). The SMB comes with the necessary cables, low-pressure tubes and fittings. For further notes on the tube run, please see Chapter 4.3-4.5.



IMPORTANT: Take care not to connect more than 6 BS5/10 to one string when planning the supply network for the atomisers (water and compressed air). Malfunctions may occur if more than 6 devices are connected. To prevent this and if required, two further strings must be created for splitting up the string (see sketch above).

4.1.1.3 Determining the compressed air and water requirements

Compressed air requirements

The compressed-air consumption of a system depends on the number of atomisers and is calculated using the following formula:

$$Q_L = n_D * 60\text{NI}/\text{min}_{\text{BS10}}$$

$$30\text{NI}/\text{min}_{\text{BS5}}$$

Q_L : Necessary air volume in NI/min

n_D : Number of devices

Related to the **example** and using the following values:

$$n_D = 5$$

The result is an air volume of **300 l/min**.



NOTE:

In order to ensure a trouble-free operation, the compressed-air system ought to deliver 1.2 times the air volume that has been calculated.

Water requirements

The water requirements of a system depend on the number of atomiser and is calculated using the following formula:

$$Q_w = n_D * 10\text{l}/\text{h}$$

Q_w : Necessary water in l/h

n_D : number of devices

Related to the **example** and using the following values:

$$n_D = 5$$

The result is a water volume of **50 l/h (110.5 lbs/h)**.



NOTE:

In order to ensure a trouble-free operation, the water system ought to deliver 1.2 times the maximum water volume that has been calculated.

4.2 Notes on the planning of an air humidification system in several areas

Here we have only one room that is, however, divided up into two areas of humidification. When a room has areas with different heat loads or when the number of air changes is not identical for the entire room, the atomisers are not able to deliver sufficient measuring results. Certain areas would be humidified not sufficiently and others too much. In these cases and similar cases, the room can be divided up into two areas of humidification.

4.2.1 Example 2 (BS5/10)

The areas of humidification were determined on the basis of the room plan.

EXAMPLE 2

A DRAABE air humidification system BS for a direct humidification of the indoor air is to be installed in a large printing works. The following data is available (index 1 for area 1, index 2 for area 2):

<i>Room (l x w x h) in ft:</i>	<i>130.0 x 98.0 x 13.0</i>
<i>Area 1</i>	<i>98.0 x 98.0 x 13.0</i>
<i>Area 2 (suspended ceiling)</i>	<i>33.0 x 98.0 x 13.0</i>

<i>Number of air changes per hour:</i>	<i>3.0₁, 1.5₂</i>
<i>Outside air conditions in winter:</i>	<i>5°F/90 % r.h.</i>
<i>Desired room temperature:</i>	<i>70°F</i>
<i>Desired air humidity:</i>	<i>53 % r.h.</i>
<i>Areas:</i>	<i>Two</i>

4.2.1.1 Calculating the maximum humidification capacity

The calculation is carried out as described under 4.1.1.1.

SOLUTION EXAMPLE 4

*For the example area 1, the result is a necessary humidification capacity of **107 kg/h (236 lbs/h)**.
For the example area 2, the result is a necessary humidification capacity of **18 kg/h (40 lbs/h)**.*

4.2.1.2 Determining the device requirements

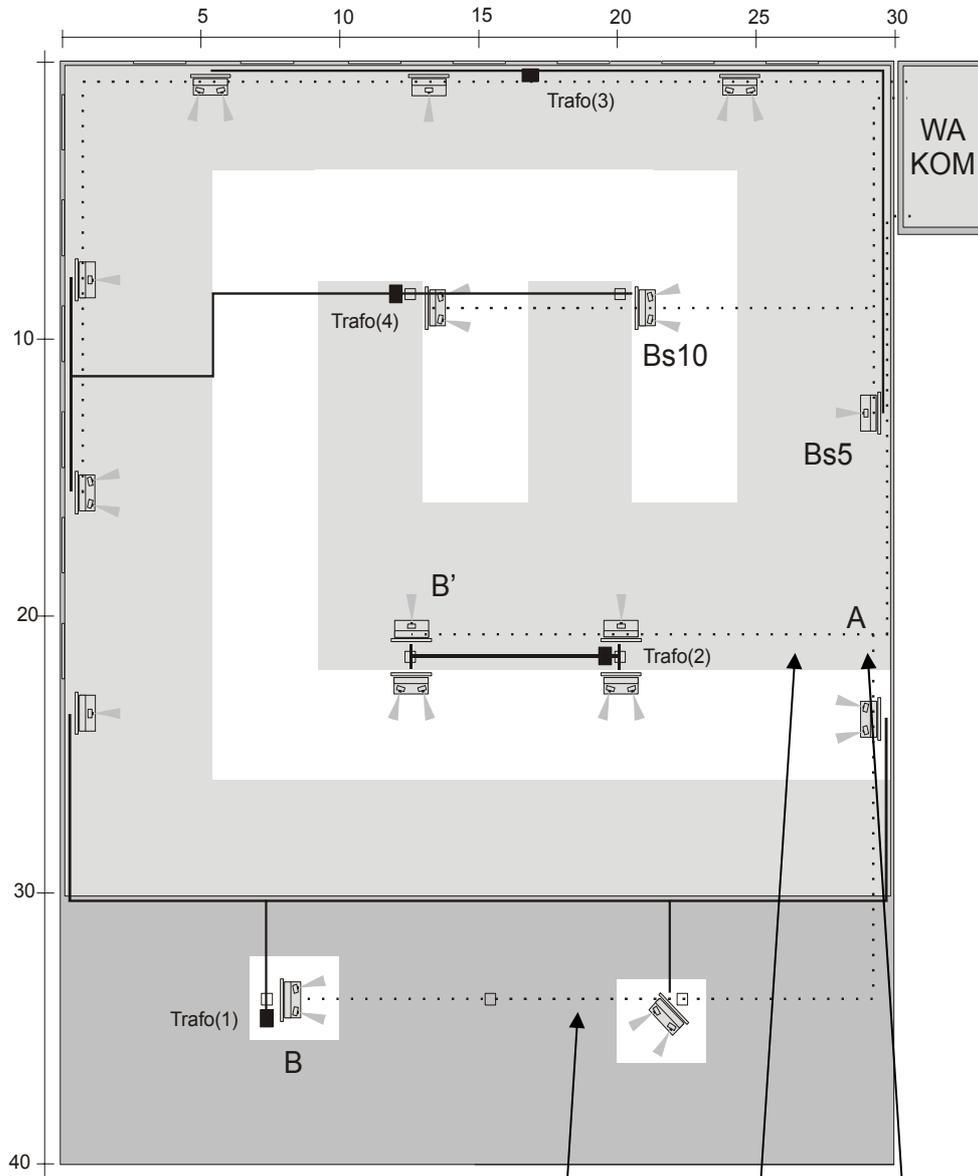
Capacity BS5	5 kg/h (11 lbs/h)
Capacity BS10	10 kg/h (22 lbs/h)

EXAMPLE 3

*For area 1:
8 units BS10
6 units BS5*

*For area 2:
2 units BS10
4 units transformers (trafo)*

The tube requirements for air and water supply depend on the tube run. It is determined on the basis of the ground plan. For this example, the result is **approx. 160 meters (525 ft)** of the NORTEC quick-assembly kit (**SMB**). The SMB includes the necessary cables, low-pressure tubes and fittings. For further information on the tube run, please see Chapter 4.3-4.5.



The solid line stands for power supply, the dotted line for air and water supply.

WA: Water treatment, if necessary
KOM: Compressor

String from A to B (B')

Point of distribution



IMPORTANT: Take care not to connect more than 6 BS5/10 to one string when planning the supply network for the atomisers (water and compressed air). Malfunctions may occur if more than 6 devices are connected. To prevent this and if required, two further strings must be created for splitting up the string (see sketch above).

4.2.1.3 Determining the compressed air and water requirements

Compressed air requirements

The compressed air consumption of a system depends on the number of atomisers.

BS5: 30 NI/min
BS10: 60 NI/min

*Related to the **example** and using the following values:*

*Area 1 = 660 NI/min
Area 2 = 120 NI/min
The result is an air volume of **780 NI/min***



NOTE:

In order to ensure a trouble-free operation, the compressed air system ought to deliver 1.2 times the air volume that has been calculated.

Water requirements

The water consumption of a system depends on the number of atomisers.

BS5 5 l/h (11 lbs/h)
BS10 10l/h (22 lbs/h)

Related to the example and using the following values:

*Area 1 = 110 l/h (243 lbs/h)
Area 2 = 20 l/h (44 lbs/h)*

*The result is an air volume of **130 l/h (287 lbs/h)**.*



NOTE:

In order to ensure a trouble-free operation, the water system ought to deliver 1.2 times the maximum water volume that has been calculated.

4.3 Notes on the water supply

The DRAABE air humidification system is a hygienic system and therefore make particular demands as far as the water to be atomised is concerned.

The systems can also be operated using untreated source water, but this involves different risks:

- In dependence on the quality of the untreated water, operating safety may be impaired.
- In dependence on the quality of the untreated water, hygiene may be impaired (depends on the organic contamination of the untreated water).
- In dependence on the quality of the untreated water, a very pronounced mineral precipitation may occur. These substances contained in untreated water precipitate out of the small droplets (aerosols) and settle on all surfaces. The functioning of processes and machines may be impaired and more cleaning needs to be done.



NOTE:

We recommend you to always use a DRAABE water treatment in order to achieve an optimum result as far as hygiene and operating safety are concerned.

All requirements regarding water preparation listed below are **extremely important** in order to ensure a safe, hygienic operation. The operator shall ensure that the following requirements are met on a permanent basis. They are fulfilled when a DRAABE pure water system is used. It also has to be subjected to regular checks and maintenance measures at regular intervals as a matter of course.

Definition of terms:

- **Untreated water:** This kind of water is water to be subjected to water treatment. This kind of water has to be treated. Other terms for untreated water are > drinking water, tap water.
- **Soft water:** see also 4.3.2 . This is water that has been softened.
- **Treated water:** This kind of water is a product of water treatment. Another term for treated water is > permeate.



CAUTION: Despite compliance with these requirements, a contamination of the system can not be excluded. Regular checks carried out by the operator are obligatory in order to avoid damage to health.

4.3.1 Requirements regarding untreated water (drinking water or tap water)

The operator shall ensure that the following requirements are met on a permanent basis.

- The water must be free of particulates > 5 μ .
- The water has to be free from colloids and/or organic substances as a matter of principle.
- Well water and rain water are not admissible.
- The water must have drinking water quality (e.g. quantity of organic substances).
- The maximum number of germs may not exceed 1000 germs/ml.
- It has to be free from chemical substances/additives (e.g. ozone, disinfectants).
- No accessory devices that alter the properties of the untreated water (e.g. dosing equipment) may be used.
- Water temperature 6-20 °C (43-68°F)
- Flow pressure 2-3 bar (43-58psi)
- Hardness maximum 20°dH (German hardness)

**NOTE:**

If the water hardness is higher than 20°dH (German hardness) it is recommended to use a water softener. Please contact the Nortec sales man if you have questions.

4.3.2 Requirements regarding water treatment

The operator shall ensure that the following requirements are met on a permanent basis.

- A three-stage water treatment system has to be used
- Water softening (<0.1 °dH at the outlet)
- Filtering (mechanical filter 5u + activated-carbon filter)
- Demineralisation by reverse osmosis (inorganic membrane)
- Water values at the outlet of the water treatment system
 - Water hardness < 0.1 °dH
 - Conductivity 5-10 µS
 - Water temperature 6-25 °C (43-77°F)
 - Flow pressure 2-3 bar (43-58psi)
- The product has to be conducted in a closed system up to point where it exits the nozzle and it may not get in contact with the air in the room any time.
- No water tanks with float control may be used. Closed membrane tanks made of stainless steel or plastic have to be used for intermediate storage of the product (pressure control) instead.
- Fittings and tubes have to be made of materials authorised for the food industry (plastic, stainless steel). Do not use copper or brass tubes!
- The treated water has to be free from organic substances.

4.4 Notes on compressed air supply



The operator shall ensure that the following requirements are met on a permanent basis.

- The compressed air must have **respiratory air quality** and be **free from contamination** (residual oil content < 0.003 mg/m³, dust, water, etc.).
- The **admissible inlet pressure on the wall brackets is max. 6 bar (without pressure fluctuations and pressure blows)**.
- When dimensioning the compressor and/or the outlet pressure, possible losses via the tube network have to be taken into consideration.
- It is recommended to install a micro filter and an activated carbon filter.
- When an manometer and a pressure-relief device are installed in the compressed air feed, the performance of the system can be assessed more easily.
- **Important!** The **compressed air line has to be blown out** before it is connected.

4.5 Notes on the run of the tubes



- Use a **suitable cutting device** (e. g. accessory AF-Z-90) guaranteeing a **straight and kink-free** cut when cutting the tubes.
- The tubes may not be kinked or damaged (longitudinal grooves).
- Make sure that the tubes are **not kinked** and that a **minimum bending radius of 40 mm (1.57 inches)** is maintained.
- Do not pass the tubes near warm or even hot components (**max. admissible ambient temperature 35°C, 95°F**).
- Avoid exposure of the tube to direct sunlight.
- In order to protect them against damage and to prevent them from sagging, the tubes have to be run between the individual components inside a protective tube, if possible.
- Upon installation, check:
 - o Whether all tubes sit tight. It is not possible to pull out correctly mounted tubes without exercising pressure on the clamping ring.
 - o The water and compressed air systems for tightness.



- It is recommended to install the network of tubes in the form of a star, if possible. When the distance between the air supply and the water supply is too large, malfunctions or even problems regarding hygiene may occur. Always call the NORTEC customer service in case of doubt (+1 613 822 0335).



- An empirical formula for the dimensioning of the network: The last atomiser of a series may be at a distance of max. 70 metres (230 ft) from the air supply and/or the water supply.

5. Installation

5.1 Safety notes on installation

- Assembly and installation may only be carried out by **authorised, qualified staff** (plumbers, electricians). The person who places the order for the installation has to ensure that they are qualified accordingly.
- All local rules and regulations on the execution of electrical installations and water installations have to be complied with.
- It is obligatory to read the notes and regulations of this chapter on the placing of system components, on assembly and electrical installations and to comply with them.

5.2 General notes on placing

The place of installation of a system is always determined during planning and noted in the system documents. The following general planning notes, however, have to be read and complied with in any case:

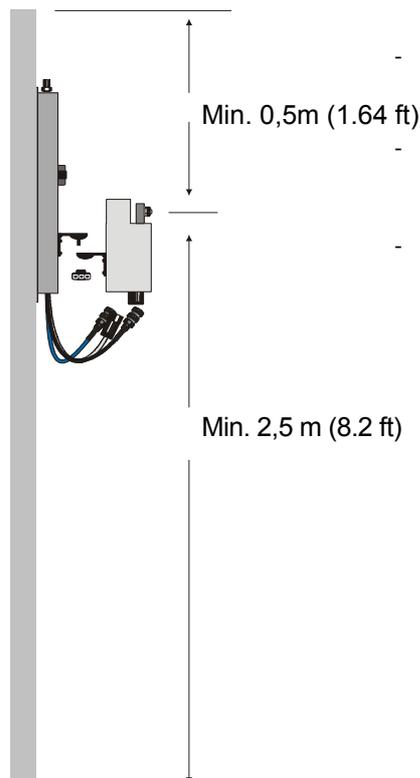
- Make sure that the construction (wall, pillar, ceiling construction, etc.) on which the devices and/or system components will be mounted disposes of a **sufficient load-carrying capacity and is suitable for fixing (see Chapter 8. "Technical data")**.
- Place the atomisers in such a way so as to enable the aerosol mist to spread freely. When the aerosol mist is prevented from that by obstacles (e.g. ceilings, beams, etc.), build-up and turbulences that may result in condensation occur.
- In the following illustration, you will find the measurements for the **expansion of the aerosol stream** and the **minimum distances that have to be kept**. The measurements relate to the maximum humidification capacity of the atomiser nozzles and a room temperature between 18° and 24°C (64 and 75°F). When the temperature is higher, the expansion of the aerosol stream is reduced, when the temperature is lower, it increases.
- When atomiser nozzles are installed one opposite the other, make sure that the distance of at least 8 m (26 ft) is maintained between the nozzles in order to avoid that the aerosol streams condensate each.
- Pay attention to the current of the room air. Do not install atomiser nozzles in the immediate vicinity of an exhaust system or of a cold-air inlet.
- Do not direct atomiser nozzles at cold parts of a building, e.g. outside walls, windows, etc. (risk of condensation).
- Insulate cold-water pipes in the area of the aerosol stream (risk of condensation).
- The evaporation process absorbs heat from the ambient air. For this reason, make sure that the aerosol stream is not directed on persons or on places directly above workplaces.
- In order to guarantee an optimum humidification, ensure that the atomisers are sensibly distributed in the room.
- The system components have to be mounted in such a way so as to provide for enough space for operation and maintenance.
- Please contact NORTEC in case you have questions on the placement.

5.3 General notes on assembly

- Installation has to be carried out according to the general engineering rules and the connection regulations of the local utility companies.
- Before the installation, check whether the delivery is complete and undamaged, using the delivery note for this purpose.
- The tubes may only be installed by certified master craftsmen that were instructed on how to proceed.
- No unauthorised conversions or alterations may be carried out on the devices.
- No additional fittings (e.g. valves, etc.) that are not included in the assembly plan may be installed in the NORTEC system.
- These assembly instructions only refer to individual systems. The manufacturer provides individual system diagrams for the customers' systems.
- Furthermore instruction measures on assembly are carried out. The assembly instructions, the diagrams and the instruction are binding for the execution.
- It is obligatory to comply with the material specifications.

5.3.1 Atomiser BS5/10

Positioning of the atomisers



- Select a distance to the ceiling of at least 0.5m (1.64 ft)
- Do not place the atomisers directly above a workplace
- The air space has to be free over a distance of 3-4m (9.84-13 ft) in an angle of 90°.
- Avoid exposure of the atomisers to direct sunlight.

Connection of the wall bracket

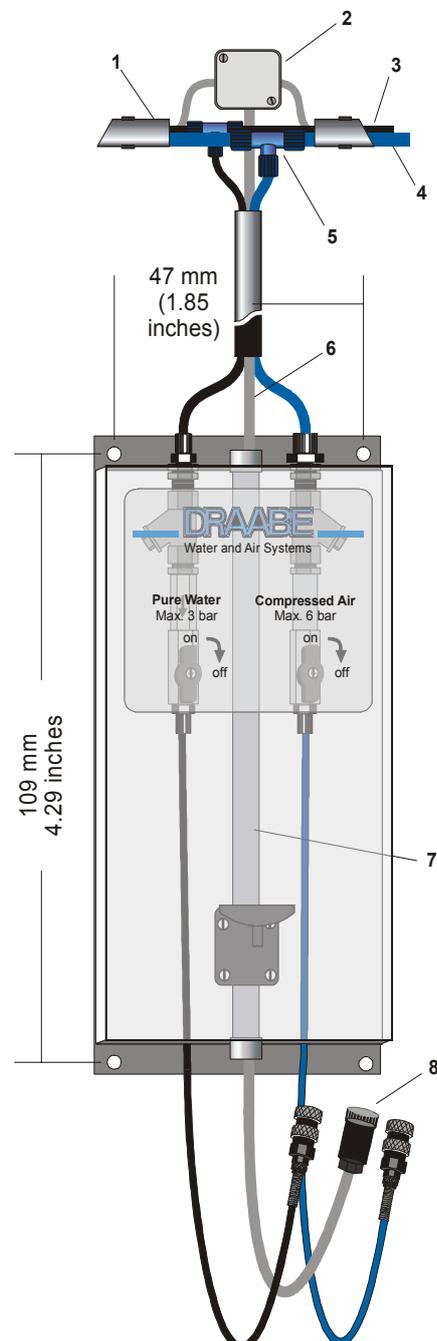
All BS devices are connected with the quick assembly kit delivered as accessory.

The connection for treated water is made using the black PU-4 tube (create branch line to the wall bracket using the enclosed T connectors).

The compressed air tube is connected using the blue PU-9 tube (create branch line to the wall bracket using the enclosed T connectors).

The power supply from the transformer is connected via junction boxes in the form of a branch line to the relevant wall bracket. On the junction box, it is run through the cable duct of the wall bracket and connected to the enclosed plugs. The length of the cables has to correspond to the length of the tubes.

- (1) Protective tube M40
- (2) Distributing box
- (3) Treated water tube PU-4
- (4) Compressed air tube PU-9
- (5) T connector
- (6) Cable HO5 VV-F-2 x 1.5 (16 AWG)
- (7) Cable inlet wall bracket
- (8) Plug



5.4 Electrical installation

The documentation does not cover the installation of the voltage supply. Requirements regarding it are covered, however.



CAUTION: The layout of the electrical installation as well as the layout of the voltage supply have to comply with the local safety regulations and standards.



NOTES on the electrical installation

It is obligatory to run the connecting cables through the cable fittings provided for that purpose in the device.



CAUTION: The atomisers may only be supplied with 48Vac, 50..60Hz.

5.4.1 BS5/10

The voltage supply for the atomisers BS5/10 is supplied directly to the wall brackets (with a junction box) via the external safety transformer (see also page 25).

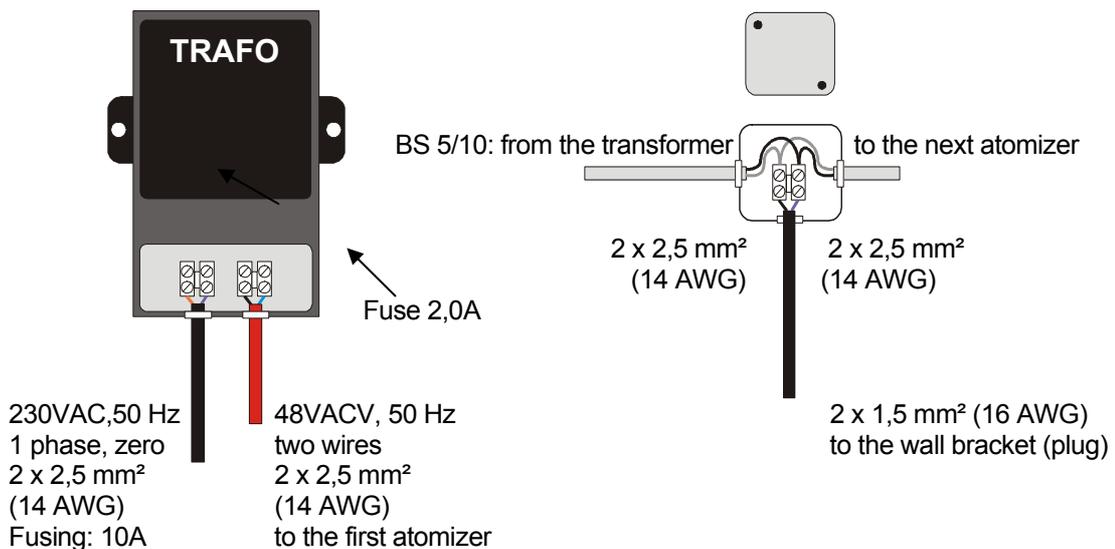


CAUTION: Before and when working on the devices, make sure that all lines are de-energised and that the voltage supply is secured against unintentional switching on.



NOTE: The transformer ought to be positioned as close as possible to the atomisers in order to avoid an unnecessary loss of voltage on the lines. **You can connect max. 4 atomisers to the supplying transformer.**

A special plug is included in the scope of delivery of the wall brackets. Only this plug may be used to connect the atomisers.



Plug connection:
Litz wire, black, sw
Litz wire, blue, bl

PIN3
PIN PE

5.5 Material specification

5.5.1 Protective tube

Insulating material tube (protective tube)

M40

Material: PVC-U
Complies with: DIN 49016, Part 2, DIN 16929, DIN 4102
Temp. range: -5°C - +60°C (23-140°F)

Quick clamps

Material: Polypropylene
Temp. range: -30°C - +90°C (-22-194°F)

Suitable for protective tube and for wall mounting.

5.5.2 Air tube and water tube

PU 4 tube, black (water side)

Material: polyurethane
6 x 4 x 1 mm
Max. operating pressure: 10 bar at 20°C (145psi at 68°F)

PU 9 tube, blue (air side)

Material: polyurethane
12 x 9 x 1,5 mm
Max. operating pressure: 7 bar at 20°C (101psi at 68°F)

Plastic coupling pieces

Material: POM
Pressure range: 0 - 10 bar (0-145psi)
Temp. range: -10°C - + 60°C (14-140°F)

Suitable for PU tube, black and blue

5.5.3 Cables

Type 1

Use: Voltage supply from domestic mains to external transformer
Description: H05 W-F 2 x 1.5 mm² (16 AWG)
Fusing (domestic mains): 10A, slow-to-blow

Type 2

Use: From external transformer to atomisers .
Description: H05 W-F 2 x 2.5 mm² (14 AWG)
Fusing (in transformer): 2.5A, slow-to-blow

6. Operation

The system may only be taken into operation by the operator or by a person authorised by him after putting into operation was accepted by the NORTEC customer service or by persons authorised by NORTEC. Furthermore it is obligatory that the operator has been introduced into operation by NORTEC. After putting into operation and introduction into operation, the operator is obligated to ensure that only trained persons operate the system. This is subject matter of the warranty terms of NORTEC.

6.1 Switching-off during daily operation

For maintenance works, the exchange of defect or to-be-serviced system components or in the event of faults in the system, it may be necessary to take the system out of operation. Information on when to switch off is included in more detail in Chapter 7 (see also the **exchange instructions** for the individual devices).



CAUTION: When switching off the system, always ensure to prevent an accidental switching-on (water supply and voltage supply, depending on the type of switching-off). The employees have to be informed about the switching-off.

6.1.1 Switching-off completely

Here parts of the system or even the entire system are/is de-energised and the water supply is switched off.

Atomiser BS5/10:

Remove the voltage supply plug from the device. The water supply and/or the compressed air supply can also be interrupted in addition by removing the quick couplings.



CAUTION: Please note that there is a risk of standstill contamination when it is switched off for a longer period of time (more than 24 hours) (fresh water automatic system not active). It is obligatory to inform the NORTEC customer service before switching it off completely.

6.1.2 Partial switching-off

Atomiser BS5/10:

Set the set-point adjuster to 20% r.h. **In this case, the fresh water automatic system is still active.**



CAUTION: You can also disconnect the water supply and/or compressed air supply of the atomisers by removing the quick couplings in order to stop the device from working. This may only be done **in an emergency**. Please note that there is a risk of standstill contamination when it is switched off for a longer period of time (more than 24 hours) (fresh water automatic system not active).

6.2 Putting into operation in daily operation

Depending on whether a partial or complete switching-off was performed, switching-on has to be performed in reverse order (see also the **exchange instructions** for the individual devices). Basically:

Atomiser BS5/10:

First connect the water supply and/or the compressed air supply (quick couplings). Then connect the voltage supply (plug). Now you can set the set-point adjuster to the desired value again on types BS5 and 10.

6.3 Checks

When irregularities or malfunctions are detected during checks, inform the NORTEC customer service at once! Checks may only be carried out by authorised staff. The operator is responsible for checking the suitability of the staff and for instructing them.

6.3.1 Atomiser BS5/10

Check the spray pattern. The ratio water consumption/compressed air consumption has a considerable influence on the spray pattern. These parameters can be set on the device. Work settings may never be changed without prior consultation of the NORTEC customer service.

Cycle:	every 2 weeks
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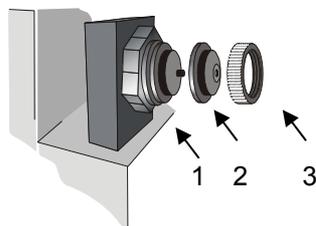


CAUTION: This check is necessary because it is possible to prevent damage when a very bad atomising result is detected in time. The worse the atomising result, the bigger the drops. Drops falling down may cause damage by corrosion.

In areas with a lot of dust and/or dirt formation, the functioning of the atomisers may be impaired. Check this and remove the dirt, if necessary.

Deposits on the nozzles may impair the spray pattern. You can try to clean them as follows as an emergency measure:

De-energise the device and switch off the stopcocks for air and water. Remove the knurled thumb screw (3) and the air cap. Remove deposits at the tip of the nozzle (1) using a soft, lint-free cloth. Never use a needle or similar solid objects for cleaning!



Cycle:	every 4 weeks
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CAUTION: Do not clean with water or any kind of cleaners, but **only vacuum it**. De-energise the device and protect against switching on before cleaning.

7. Exchange of components

Please notify NORTEC Service if you find a fault in the system.

If there is a question please call **+1 613 822 0335**.

The exchange is to be made only by instructed, trained personnel. The operator is obliged to make sure that the personnel is suited, has been instructed and trained as required. He is obligated to comply the instructions of DRAABE in the process, especially the instructions contained in this documentation.

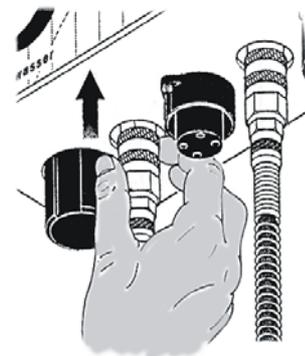
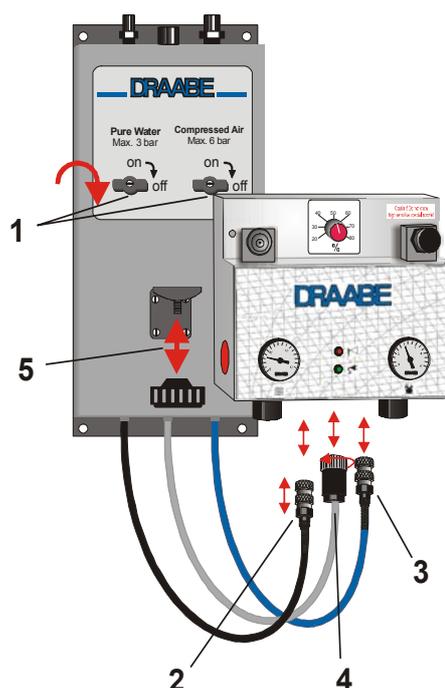


CAUTION:

Please inform the people working nearby that works will be carried out on the air humidification system. Make sure that the system cannot be switched on unintentionally.

7.1 Atomiser BS5/10

1. Close the shut-off valves (1) on the wall bracket.
2. Pull off the plug couplings (2) and (3) for compressed air and water. Press down the knurled ring and then pull out the plug couplings downwards in order to do that.
3. Pull off the plug (4). Loosen the knurled ring on the plug by turning it anti-clockwise and pull out the plug downwards for that purpose.
4. Remove the atomiser by unscrewing the star knob screw (5) and attach the new atomiser.
5. Connect the new atomiser in reverse order (do not connect the supplying lines crosswise!) Set the desired set point, for example 50% r. h.) on the hygostat. Adjust the atomiser by means of the star knob screw (5).



8. Technical data

8.1 Atomiser BS5/10

	BS 5		BS 10
Capacity	5 kg/h (11lbs/h)*		10 kg/h (22lbs/h)*
Compressed air requirements	30 Nlm		60 Nlm
Working pressure air / water	3-4 bar/0.2-0.4 bar 43-58psi/2.9-5.9psi* ¹		
Dimensions (w x h x d) in inches	8.26 x 21.7 x 9.84		
Weight	Approx. 6.06 pounds		
Operating voltage	48 VAC, 60 Hz, ±10%		
Power input	20W		
Overvoltage category	II		
Pollution degree	2		
Application	Only inside		
Height above sea level	2,000 m (6670 ft)		
Ambient temperature	7-35°C (45-95°F)		
Ambient humidity	Max. 80 %, prevent condensation		

*: Depending on the set water / air ratio

*₁: factory settings

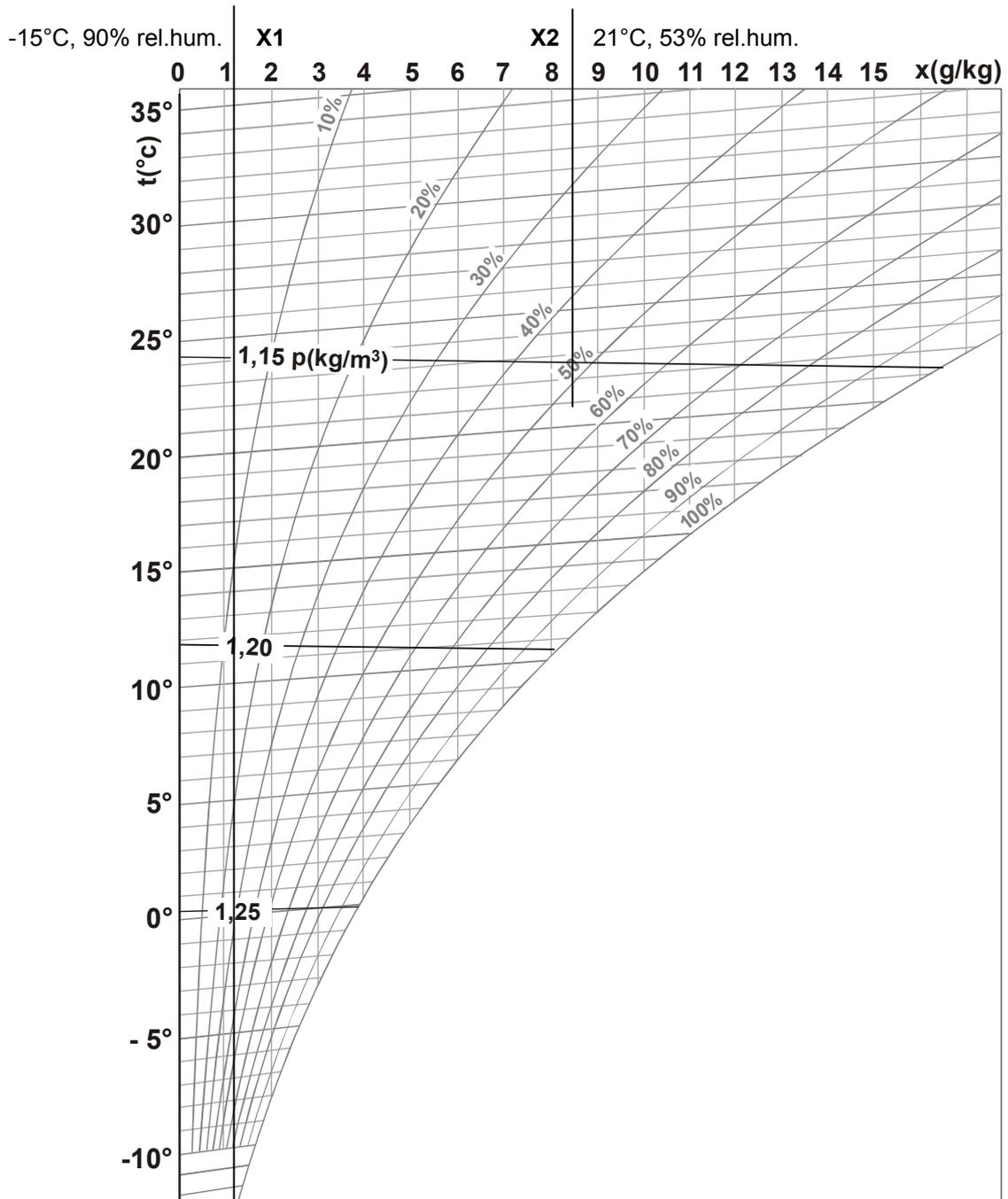
9. Annex

9.1 Accessories/spare parts

Position	No of the article	Designation of the article
1	AF-Z-90	Cutter
2	004017	Filter 5 micron

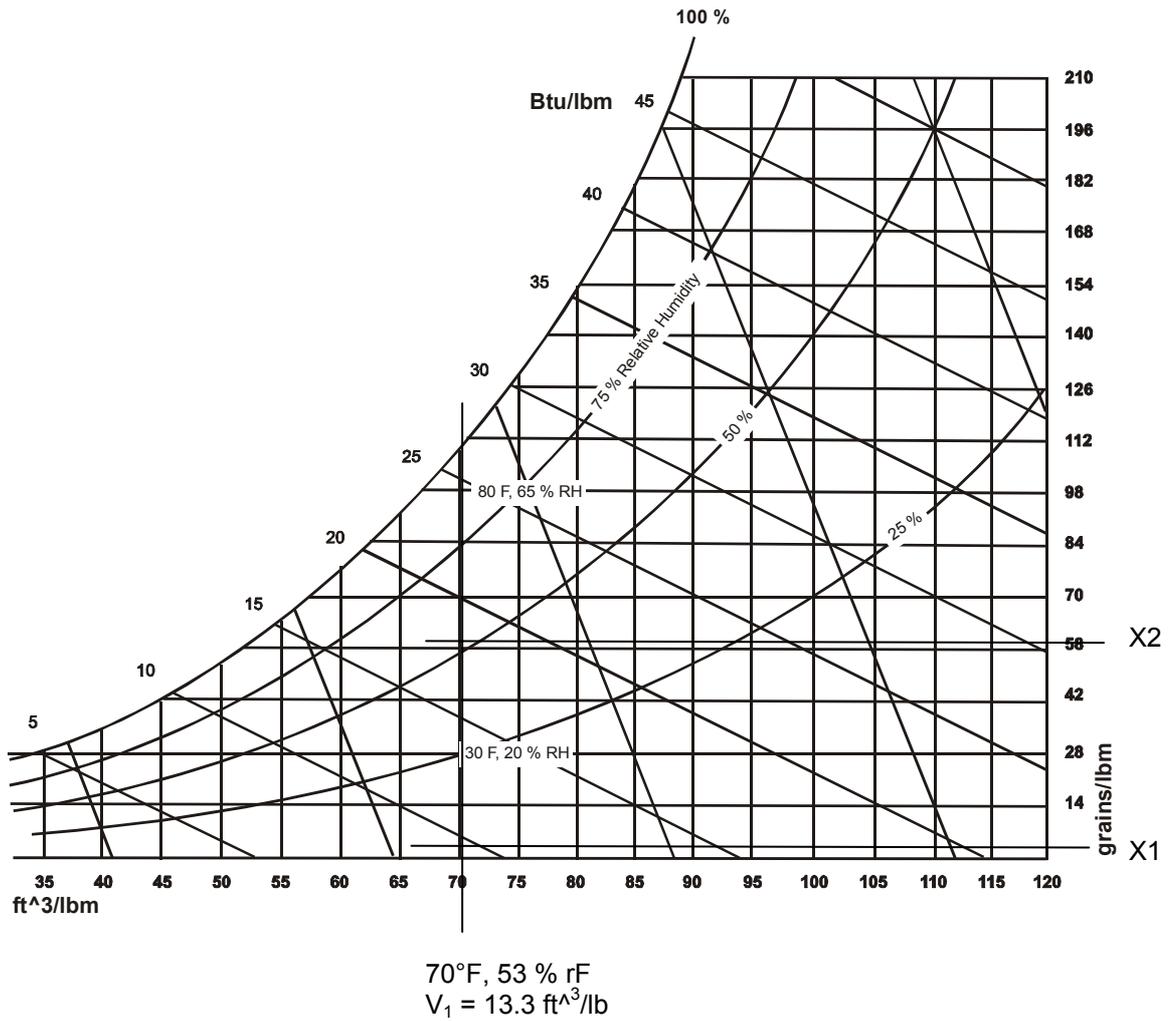
9.2 psychometric chart (with m and kg)

Humidification **shortfall** = $X_2 - X_1 = 8.3 \text{ g/kg}$



9.3 psychrometric chart (with ft and lb)

Humidification **shortfall** = $X2 - X1 = 51 \text{ lb}$



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